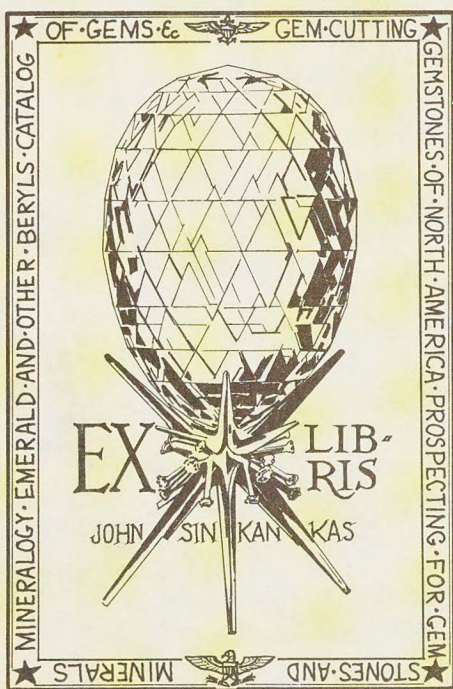


CALCITE

New Forms

Schaller

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cat
W. F. FOSHAG
Division of Mineralogy

PROCEEDINGS

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FIGS. 1-8

MARCH 31, 1909

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WITH NEW FORMS

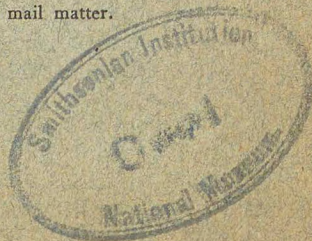
BY

WALDEMAR T. SCHALLER

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PROCEEDINGS
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VOL. XI, No. 1, PP. 1-16 Figs. 1-8 MARCH 31, 1909

SOME CALCITE CRYSTALS WITH NEW FORMS.

BY WALDEMAR T. SCHALLER.

1. CALCITE FROM ANDREASBERG

Several specimens of calcite labeled "Andreasberg, Harz Mts.," were purchased from a local mineral dealer. One specimen shows large tabular crystals with only the base $\{0001\}$ and prism $\{10\bar{1}0\}$. Other specimens consist of groupings of tabular crystals which are somewhat unusual in their combinations. These tabular clacites are arranged in superimposed parallel, or nearly parallel groupings forming vertical columns several cm. long, the individual crystals being up to 13 mm. wide and to 5 mm. high. The dominant forms on these crystals are the base $\{0001\}$ and prism $\{10\bar{1}0\}$ but characteristically all of them also show the new prism $\bar{j}\{7.6.13.0\}$ as narrow rounded faces. Very narrow faces of $s\{05\bar{5}1\}$ and minute faces of $v\{21\bar{3}1\}$ are frequently present. Some of these crystals which seemingly consist of a single crystal show an easy parting parallel to the base and may be built up of numerous thinner tabular ones in parallel position. Associated with these calcites are numerous fourlings of harmotome.

Measurements of the ϕ angle for $s\{05\bar{5}1\}$ varied from $78^{\circ} 38'$ to $78^{\circ} 47'$; calc. = $78^{\circ} 32'$.

The dihexagonal prism faces are bright but rounded, so that no accurate measurements could be made. They gave, however, a bright signal in the mass of reflections caused by the rounded surfaces and the measurements given below were of this bright signal.

The faces are seen to be in the prism zone mm' and therefore could not be scalenohedrons with complex indices.

ϕ meas. = $27^\circ 34'$	ϕ calc. $\{7.6.\bar{1}3.0\} = 27^\circ 27'$
20	
32	
37	
Av. = $27^\circ 31'$	

This prism face is present on all of the crystals, of which but few, however, are suitable for measurement. The results just given were all obtained from one crystal. It seems odd that this form has not been described before—at least the writer could find no mention of it in the literature—as the specimens are supposed to come from a locality so well known for its calcites.

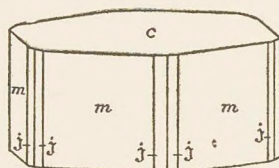


FIG. 1

It seems hardly correct to regard these prism faces as corrosion forms or some other secondary formation. While the base and prism faces on these calcites are dull, they do not show any definite signs of etching, and though the new prism faces are rounded, they are considered as belonging to a well established form for calcite. As stated, the form occurs on all of the crystals, and all twelve of the faces are present on each crystal. They are shown in fig. 1.

2. CALCITE FROM ENGLAND

The crystals here described are from a group containing individual ones, the largest of which measure 4 cm. by 2 cm. The exact locality is not known. The crystals have a trigonal habit due to the predominance of a steep negative rhombohedron. The forms present on these crystals are: $r\{10\bar{1}1\}$, $M\{40\bar{4}1\}$, $n\{50\bar{5}1\}$, $y\{60\bar{6}1\}$, $o\{11.0.\bar{1}1.2\}$, $e\{01\bar{1}2\}$, $f\{02\bar{2}1\}$, $d\{08\bar{8}1\}$, $C\{0.13.\bar{1}3.1\}$,

$n\{41\bar{5}3\}$, $G:\{72\bar{9}5\}$, $w\{31\bar{4}5\}$, $v\{21\bar{3}1\}$, $R\{53\bar{8}2\}$, $y\{32\bar{5}1\}$, and a new form $p\{4.20.\bar{2}4.7\}$. The following table gives the average of the measured angles compared with the calculated value.

LETTER	SYMBOL	NO. MEAS.	MEASURED		CALCULATED	
			ϕ	ρ	ϕ	ρ
<i>M</i>	40 $\bar{4}1$	3	0° 02'	75° 48'	0° 00'	75° 47'
<i>n.</i>	50 $\bar{5}1$	2	0 02	78 11	0 00	78 32
<i>o.</i>	11.0. $\bar{1}1$.2	1	0 12	79 35	0 00	79 33
<i>y.</i>	60 $\bar{6}1$	2	0 02	80 11	0 00	80 24
<i>e</i>	01 $\bar{1}2$	2	0 00	26 15	0 00	26 15
<i>f</i>	02 $\bar{2}1$	5	0 00	63 07	0 00	63 07
<i>d</i>	08 $\bar{8}1$	4	0 00	83 01	0 00	82 46
<i>C.</i>	0.13. $\bar{1}3$.1	1	0 12	85 30	0 00	85 32
<i>n</i>	41 $\bar{5}3$	1	10 55	56 22	10 54	56 26
<i>G:</i>	72 $\bar{9}5$	3	12 22	58 22	12 13	58 14
<i>w</i>	31 $\bar{4}5$	2	14 25	35 05	13 54	35 25
<i>v</i>	21 $\bar{3}1$	2	19 07	69 10	19 07	69 02
<i>R</i>	53 $\bar{8}2$	8	21 43	74 28	21 47	73 51
<i>y</i>	32 $\bar{5}1$	2	23 21	77 02	23 25	76 54
<i>p</i>	4.20. $\bar{2}4$.7	13	8 56	72 09	8 57	72 20

The indices of the form above referred to as $\{4.20.\bar{2}4.7\}$ could not be definitely determined. Many faces of this form are present in these crystals, in fact, the form is a characteristic one for this group as it is present on all the crystals. But it is always rounded and uneven and will give when mounted on the goniometer, either a group of reflections or else two or three distinct signals. The various measurements for this form are given below.

CRYSTAL NO.	SIZE OF FACE	NO. SIGNALS	REFL.	Calc. ϕ = 8° 57'	Calc. ρ = 72° 20'	
1	minute	2	{ p. p. f.	8° 17' 8 20 8 23	72° 08' 71 36 71 40	signal distinct. signal very faint. signal distinct.
1	small	3	{ p. p. f.	8 20 8 23 8 48	72 08 71 15 71 59	signal very faint. signal very faint. signal distinct.
1	small	3	{ p. p. p.	8 26 9 01 8 23	71 31 72 19 71 40	signal very faint. signal very faint. signal distinct.
1	small	3	{ p. p. p.	8 46 9 06 8 54	71 05 72 19 72 15	signal distinct. signal distinct. signal very faint.
2	minute	1	{ p. f.	8 54 9 13	72 15 72 17	signal very faint. signal distinct.
2	small	3	{ p. p. f.	8 52 8 15 9 56	71 58 71 30 72 20	signal very faint. signal very faint. many signals.
2	small	1	{ f. f.	10 19 9 24	73 23 72 04	signal very faint. signal very faint.
2	small	3	{ p. p. f.	9 24 10 17 9 16	72 04 73 43 72 41	signal very faint. signal very faint. signal distinct.
2	minute	2	{ p. p.	8 37 8 44	71 48 71 56	signal very distinct. signal distinct.
3	small	2	{ p. p.	9 23 9 07	72 38 72 38	signal distinct. signal distinct.
3	small	2	p.	8 34	71 58	signal distinct.
3	minute	1	p.	9 15	72 36	one distinct signal.
3	small	1	p.	8 48	72 51	signal distinct.

Average of meas. of 13 faces 8° 56' 72° 09'

An average of the values with "signal distinct" is 8° 45' 72° 11' or nearly the same.

While these measurements are near to the angular values of the simple form $\{15\bar{6}2\}$, which are $\phi = 8^\circ 57'$, $\rho = 70^\circ 00'$, the ρ angle is sufficiently different to preclude their reference to this form. If we take the average measured value $\phi = 8^\circ 56'$, $\rho = 72^\circ 09'$, we find that the ratio $h:k = 1:5$ (ϕ calc. = $8^\circ 57'$), while the ratio $i:l = 3.392$ which gives as the indices $1.5.\bar{6}.1\frac{3}{4}$ or $4.20.24.7$, which are not especially complex and the calculated angles for which are $\phi = 8^\circ 57'$, $\rho = 72^\circ 20'$

agreeing fairly well with the average of the above given measurements. The above detailed description is given in order to call attention to these trigonal calcites in the hope that some one would find a similar group having this new form which would admit of accurate measurement and thereby definitely determining the symbol of this form.

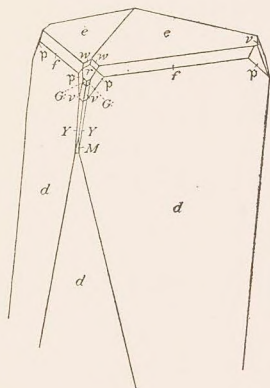


FIG. 2

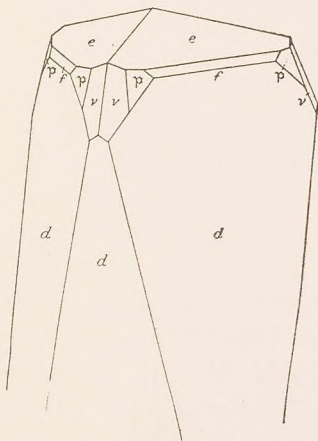


FIG. 3

A single minute face of $C \cdot \{0.13.\bar{1}3.1\}$ was noted and this was poorly developed, giving a poor reflection. Sansoni¹ gives this form

¹ Zeit. Kryst. Min., x, 564.

² Min. Pet. Mitth. xii, 487, 1891. (Ref. Z. Kryst., xxiv, 431.)

as new and it is also described by Höfer² as new, being determined by zonal relations; but it is considered as doubtful by Goldschmidt,³ he suggesting that the correct symbol may be $\{0.14.\overline{14}.1\}$ though Sansoni's measurements, like the writers above, agree well for $\{0.13.\overline{13}.1\}$. Fig. 2 shows one of the smaller crystals of this group with the important forms developed at one corner. As shown in this figure, the combinations vary at similar crystallographical places, being oftentimes much simpler at some corners than others. While all the intersection lines are here drawn straight, most of them are considerably curved on the crystals, this being particularly true of the larger crystals, which, moreover, show a much simpler combination than the smaller ones. Fig. 3 is an attempt to show the actual appearance of these larger crystals.

3. CALCITE FROM CALIFORNIA

The crystals here described were collected by the writer some years ago. They occurred in cavities in what seems to be an altered rock near Fort Point, San Francisco. They were found in the same locality which has furnished pectolite and datolite⁴ as well as apophyllite and gyrolite⁵ though the crystals here described were not found directly associated with any mineral other than quartz. The crystals are of the common scalenohedral v habit of calcite with e and r as termination, and often reach a size of several cms. They differ somewhat from the ordinary calcite crystals, in that the form $Y\{5382\}$ is almost always present as a very narrow face below v and minute faces of $N\{4.16.\overline{20}.3\}$ are also almost always present. One single crystal, colorless and transparent, and about 4 mm. in diameter showed some differences from the other crystals and was therefore measured. The essential difference was that the e faces were replaced by two faces of $\gamma\{23\overline{5}8\}$, the e faces being entirely absent. In addition a new form in the zone $r\ e$ was noted. The forms present on this crystal are: $r\{10\overline{1}1\}$, $v\{21\overline{3}1\}$, $Y\{5382\}$, $\gamma\{23\overline{5}8\}$, $N\{4.16.\overline{20}.3\}$, and the new form $k\{1.6.\overline{7}.13\}$. The average measured angles are compared with the calculated one in the following table:

³ Index. Kryst. Form. I, 388.

⁴ Bull. Dept. Geol. Univ. Cal., ii, no. 10, 1901.

⁵ Bull. U. S. Geol. Survey, 262, 124, 1905.

LETTER	SYMBOL	NO. MEAS.	MEASURED		CALCULATED	
			ϕ	ρ	ϕ	ρ
<i>v</i>	21 $\bar{3}$ 1	2	19° 04'	69° 04'	19° 07'	69° 02'
<i>r</i>	5382	2	21 42	74 13	21 47	73 51
<i>y</i>	23 $\bar{5}$ 8	6	23 22	28 19	23 25	28 15
<i>N</i>	4.16. $\bar{20}$.3	4	10 55	80 32	10 54	80 35
<i>k</i>	1.6. $\bar{7}$.13	3	7 31	26 27	7 35	26 27

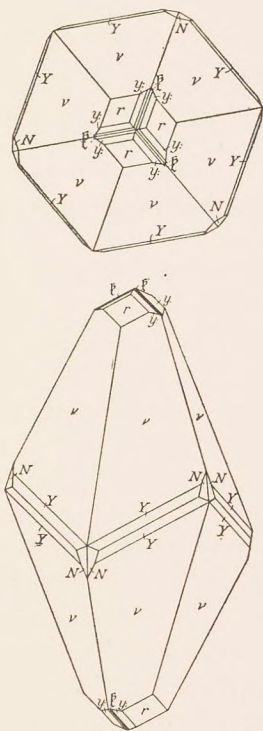


FIG. 4

Only three faces of the new form are present. They are all narrow and bright but striated like almost all the faces in this zone. This striation caused the reflections, particularly the first one, to broaden out so that accurate measurement was not possible. The three measurements are:

calc. for $\{1.6.\bar{7}.13\}$	$\phi = 7^\circ 35'$	$\rho = 26^\circ 27'$
meas. (1)	= 7 57	= 26 34
(2)	= 7 04	= 26 24
(3)	= 7 01	= 26 24

The form is considered as well established. It is shown in fig. 4 which illustrates the ideal combination found on the crystal measured.

4. CALCITE FROM NEW MEXICO

These crystals were received from Mr. C. H. Gordon, the locality being Macey's Mine, $2\frac{1}{2}$ miles east of Hillsboro, New Mexico. They are in loose crystals, a centimeter thick and somewhat longer and are associated with large endliche crystals. The calcites often have partially adhering white or pink gangue. Almost all the crystals, usually doubly terminated, show only the prism $m\{10\bar{1}0\}$ and the negative rhombohedron $e\{01\bar{1}2\}$. The e faces are striated parallel to their intersection with r while the prism faces are covered with triangular markings or etch figures. These triangular markings always point toward the e face, the base of the triangle being nearest the r face.

Two crystals showed considerable differences from the others and were therefore measured with the results given below. Crystal no. 1 is prismatic, 12 mm. long and 4 mm. thick, is colorless and transparent. It is shown in fig. 5 which represents the crystal as it actually is, excepting that the narrow scalenohedra in the zone $r\ e$ are not shown. The forms present on this crystal are: $m\{10\bar{1}0\}$, $a\{11\bar{2}0\}$, $r\{10\bar{1}1\}$, $M\{40\bar{4}1\}$, $\omega\{28.0.\bar{2}8.1\}$, $e\{01\bar{1}2\}$, $w\{31\bar{4}5\}$, $G\{52\bar{7}9\}$, $t\{21\bar{3}4\}$, $v\{21\bar{3}1\}$ and the new form $\text{I}\{3.10.\bar{1}3.3\}$.

The following table shows the angular values:

LETTER	SYMBOL	NO. MEAS.	MEASURED		CALCULATED	
			ϕ	ρ	ϕ	ρ
r	$10\bar{1}0$	3	$0^\circ 01'$	$44^\circ 36'$	$0^\circ 00'$	$44^\circ 36'$
M	$40\bar{4}1$	3	0 01	75 44	0 00	75 47
ω	$28.0.\bar{2}8.1$	3	0 01	87 48	0 00	87 55
e	$01\bar{1}2$	1	0 05	26 16	0 00	26 15
w	$31\bar{4}5$	1	14 08	35 20	13 54	35 25
G	$52\bar{7}9$	2	15 56	34 27	16 06	34 23
t	$21\bar{3}4$	1	19 55	32 57	19 07	33 07
v	$21\bar{3}1$	4	19 06	69 07	19 07	69 02
I	$3.10.\bar{1}3.3$	2	12 56	75 33	12 44	75 31

For the new form $\{3.10.\bar{1}3.3\}$ only two faces are present both of which gave poor reflections, one much more so than the other. The one giving a poor but distinct signal, gave:

$$\phi = 12^\circ 54' \text{ (calc. = } 12^\circ 44') \text{ }$$

$$\rho = 75 \ 36 \text{ (calc. = } 75 \ 31) \text{ }$$

The limits of repeated measurements of these two faces gave:

calc. for $\{3.10.\bar{1}3.3\}$	$\phi = 12^\circ 44'$	$\rho = 75^\circ 31'$
meas. (1)	$12^\circ 42' - 13^\circ 03'$	$75^\circ 30' - 75^\circ 36'$
meas. (2)	$12 \ 24 - 13 \ 17$	$75 \ 29 - 75 \ 36$
Average	$12^\circ 56'$	$75^\circ 33'$

The form was seen to lie in the zone rm and measurement of the angle $(10\bar{1}1) : (\bar{1}3.10.3.3)$ gave $50^\circ 35'$ (calc. $50^\circ 16'$). The form, considered as well established is shown in fig. 5.

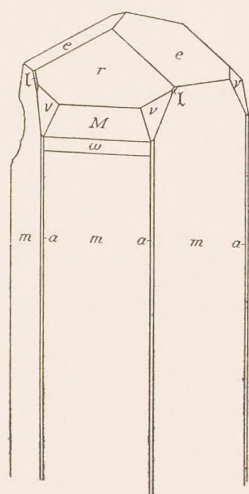


FIG. 5

Crystal no. 2 is incomplete, and as now formed, nearly equidimensional, measuring a centimeter in diameter. It is colorless and while transparent in part, is cloudy and translucent in other places. The forms present on this crystal are: $m\{10\bar{1}0\}$, $r\{10\bar{1}1\}$, $e\{01\bar{1}2\}$, $f\{02\bar{2}1\}$, and the three new forms $o\{0.14.\bar{1}4.17\}$, $O\{8.2.10.3\}$,

$q\{2.16.\bar{18}.1\}$ of which the latter is doubtful. The angular values are given in the following table:

LETTER	SYMBOL	NO. MEAS.	MEASURED		CALCULATED	
			ϕ	ρ	ϕ	ρ
r	10 $\bar{1}1$	1	0° 29'	44° 56'	0° 00'	44° 36'
e	01 $\bar{1}2$	3	0 00	26 15	0 00	26 15
f	02 $\bar{2}1$	2	0 00	63 33	0 00	63 07
o	0.14. $\bar{14}$.17	3	0 00	39 02	0 00	39 05
O	8.2. $\bar{10}$.3	2	10 29	70 58	10 54	71 38
q	2.16. $\bar{18}$.1	4	5 43	86 33	5 49	86 36

The large faces of $O\{8.2.\bar{10}.3\}$ are dull and give no distinct signal, only a blaze of light. Two faces were measured with the following result:

calc. ϕ	= 10° 54'	ρ	= 71° 38'
meas. (1)	= 10 21	meas. (1)	= 71 07
meas. (2)	= 10 36	meas. (2)	= 70 48

Although the faces are dull and give no distinct reflections, the measurements serve to fix the indices and as the form occurs in large plane faces it is considered as well established. The corresponding negative scalenohedron $B\{2.8.\bar{10}.3\}$ has been noted a number of times. Measurements for the form $o\{0.14.\bar{14}.17\}$ are as follows, the faces being bright and giving fairly good reflections.

The angles between the three faces of this form and e were measured.

0.14. $\bar{14}$.17 : 01 $\bar{1}2$	= 12° 52	- 12° 53'	ρ = 39° 07'	- 39° 08'
	= 12 44	- 12 45	= 38 59	- 39 00
	= 12 43	- 12 44	= 38 58	- 38 59
	Average (ρ) = 39° 02'			
	limits, 38° 58' - 39° 08'			

The only form for which the angle agrees is the complex one $\{0.14.\bar{14}.17\}$. Two simple ones which approximate to $\{0.14.\bar{14}.17\}$ are given in the table below, but as can be seen neither one is sufficiently close to the measured values.

calc. for $\{05\bar{5}6\}$,	= 39° 25'
calc. for $\{0.9.\bar{9}.11\}$	= 38 54

Four faces of the form $\{2.16.\overline{18}.1\}$ are present, the remainder of the crystal having cleaved off. While all the faces are bright, they are very rounded and in some cases form with $m\{10\overline{1}0\}$ a rounded surface. They gave, however, a bright signal in the midst of the mass of signals caused by the rounded surfaces and it is these single bright signals that were measured.

calc. $\phi = 5^\circ 49'$	$\rho = 86^\circ 36'$
meas. 5 48	86 39
5 31	86 27
5 54	86 33
5 37	86 33
Av. = 5 43	86 33

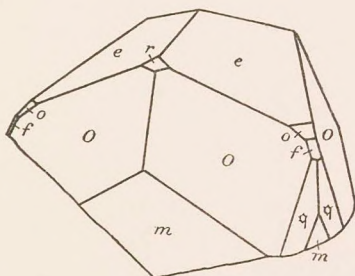


FIG. 6

Measurements of the prism face (in zone cem) gave $\rho = 89^\circ 58'$ instead of $90^\circ 00'$. While the above measurements agree very well with the calculated angles, the form cannot be considered as determined, as it is too rounded. It must be classed as a doubtful form. The forms are shown in fig. 6, in which it is attempted to show the crystal as it actually is.

5. CALCITE FROM RHODE ISLAND

The crystals here described were received from Mr. A. L. Stevenson of Providence, R. I., and the locality is given as Dexter Lime Quarry, Lincoln, R. I. To the kindness of Mr. Stevenson in sending the specimens the writer's thanks are due. The crystals are on limestone and are associated with a pearly mineral forming almost color-

less spherulites which have become brown on the surface. Other specimens show "nacrite," a talcose or micaceous mineral, quartz in flattened crystals, and curved rhombohedra of dolomite.

The calcite is found in three types of crystals:

- (1) simple rhombohedra $r\{10\bar{1}1\}$, abundant.
- (2) crystals apparently prismatic and more fully described below.
- (3) scalenohedral crystals showing large faces of $v\{21\bar{3}1\}$, but the crystals were so rounded that no measurements were made of them. Those of the second type are found on the rhombohedra of the first type and are not over several millimeters long while the simple rhombohedra are seldom over a millimeter thick. While the rhom-

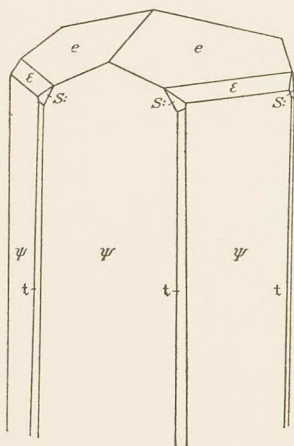


FIG 7.

bohedral crystals are usually smooth and bright, those of the second type are very much etched and rounded, making it difficult to obtain satisfactory readings. The crystals have a prismatic appearance due to the presence of the negative rhombohedron $\Psi\{0.17.\bar{1}7.1\}$ and a form vicinal to $a\{11\bar{2}0\}$ and having the approximate symbol $\mathfrak{t}\{17.16.\bar{3}3.1\}$. No prism faces were noted on the single crystal measured. The forms present are: $e\{01\bar{1}2\}$, $\epsilon\{01\bar{1}1\}$, $\Psi\{0.17.\bar{1}7.1\}$, $S:\{11.8.19.3\}$?, $\mathfrak{t}\{17.16.\bar{3}3.1\}$?. The faces of most of these forms were so poor that the correct symbols could not be definitely determined. Fig. 7 shows the general appearance of the crystal except that while the intersection of two faces is here shown as a straight line on the crystal they are frequently curved and rounded. The

crystal was set in polar position by means of the e faces and the other forms gave the following measurements:

$$\varepsilon\{01\bar{1}1\}, \rho \text{ calc.} = 44^\circ 36' \quad \text{meas. } 47^\circ 53'$$

$$45 \ 45$$

$$42^\circ - 45^\circ$$

All faces gave a mass of signals.

$$\Psi\{0.17.1\bar{7}.1\} \rho \text{ calc.} = 86^\circ 35' \quad \text{meas. } 87^\circ 07'$$

$$86 \ 12$$

$$86 \ 45$$

$$86 \ 16$$

$$86 \ 30$$

$$86 \ \text{approx.}$$

All faces gave merely a mass of brightness and the angles measured represent the center of this mass.

$$S:\{11.8.\bar{1}9.3\}, \text{calc. } \phi = 24^\circ 48' \quad \rho = 79^\circ 34'$$

$$\text{meas.} = 25 \ 15 \quad = 78 \ 42$$

$$\text{meas.} = 25 \ 35 \quad = 78 \ 05$$

$$t\{17.16.\bar{3}3.1\} \text{calc. } \phi = 28^\circ 59' \quad \rho = 87^\circ 58'$$

$$\text{meas.} = 29 \ 27 \quad = 88 \ 08$$

$$\text{meas.} = 28 \ 41 \quad = 87 \ 51$$

$$\text{meas.} = 29 \ 21 \quad = 87 \ 21$$

$$\text{meas.} = 28 \ 26 \quad = 87 \ 28$$

The agreement is only approximate, but the faces were so poor that only two out of the six could be even approximately measured.

Here again the symbol is only an approximate one. If we change the orientation of the crystal to that given by Goldschmidt in his Winkeltabellen the indices of this last form become $(49.1.\bar{5}0.1)$ and it is not possible to say whether they should not be, for instance, $(50.1.\bar{5}1.1)$, etc. Even in the orientation here taken, the average of the four measured angles agrees well for a number of forms.

Av. of 4 meas. angles	= $28^\circ 59'$	= $87^\circ 42'$
Calc. for $17.16.\bar{3}3.1$	28 59	87 58
Calc. for $16.15.\bar{3}1.1$	28 56	87 50
Calc. for $15.14.\bar{2}9.1$	28 52	87 41

However, while the correct indices could not be determined, we have here a form with indices near to one of those given above and still too far removed from the prism $a\{11\bar{2}0\}$ to be referred to that form. The writer could find no form for calcite approximating to those just

given and the form would seem to be new, though it cannot be definitely determined.

6. CALCITE FROM TEXAS

A crystal of scalenohedral habit, from the Mariposa and Marfa Mine, Terlingua, Texas, associated with montroydite and terlinguaite showed the following forms, $r\{10\bar{1}1\}$, $\varepsilon\{01\bar{1}1\}$, $v\{21\bar{3}1\}$, $t\{21\bar{3}4\}$, $g\{12\bar{3}2\}$ and the new form $h\{11.5.\bar{1}6.21\}$. The following table shows the measurements:

LETTER	SYMBOL	MEASURED		CALCULATED	
		ϕ	ρ	ϕ	ρ
ε	$01\bar{1}1$	$0^\circ 02'$	$44^\circ 37'$	$0^\circ 00'$	$44^\circ 36'$
t	$21\bar{3}4$	$19\ 23$	$33\ 07$	$19\ 06$	$33\ 07$
g	$12\bar{3}2$	$19\ 06$	$51\ 34$	$19\ 06$	$52\ 32$
h	$11.5.\bar{1}6.21$	$17\ 39$	$33\ 43$	$17\ 47$	$33\ 40$

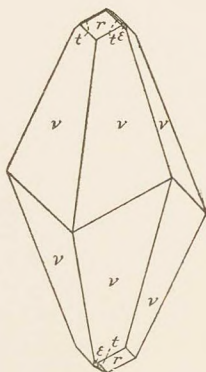
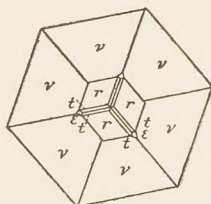


FIG. 8

The negative unit rhombohedron $\epsilon\{01\bar{1}1\}$, a rare form, is present as three faces, all very small, giving poor reflections. The new form shows only one face, a very narrow one, not striated and giving a fair reflection. It is very close to $t\{21\bar{3}4\}$ with which it occurs. The signal is slightly blurred and measurements of the two sides of the signal gave:

$$\begin{aligned}\phi &= 17^\circ 25' \text{ to } 17^\circ 53'; \rho = 33^\circ 42' \text{ to } 33^\circ 44'. \\ \text{calc.} &= 17^\circ 47'; \text{calc.} = 33^\circ 40' .\end{aligned}$$

While the indices are somewhat complex, if we change them to the orientation given by Goldschmidt (G_2) in his Winkeltabellen the indices become $\{7297\}$ and the form fits in well between two known forms.

$$\begin{aligned}62\bar{8}2 & (G_2) \\ 7297 & \text{ new form.} \\ 8.2.\bar{1}0.8 & (G_2).\end{aligned}$$

Though occurring but once the form is considered as well established. The crystal is shown in fig. 8, on which, however, the new form is not drawn, but its position can be easily determined as it lies very close to $t\{21\bar{3}4\}$.

SUMMARY

The new forms for calcite described in this paper are grouped together in the following table, the coördinate angles ϕ and ρ being given for each form.

Well established new forms

NO.	SYMBOL		ϕ	ρ
1	<i>j</i>	7.6. $\bar{1}3$.0	27° 27'	90° 00'
2	<i>o</i>	0.14. $\bar{1}4$.17	0 00	39 05
3	<i>O</i>	8.2. $\bar{1}0$.3	10 54	71 38
4	<i>h</i>	11.5. $\bar{1}6$.21	17 47	33 40
5	<i>k</i>	1.6. $\bar{7}$.13	7 35	26 27
6	<i>l</i>	3.10. $\bar{1}3$.3	12 44	75 31

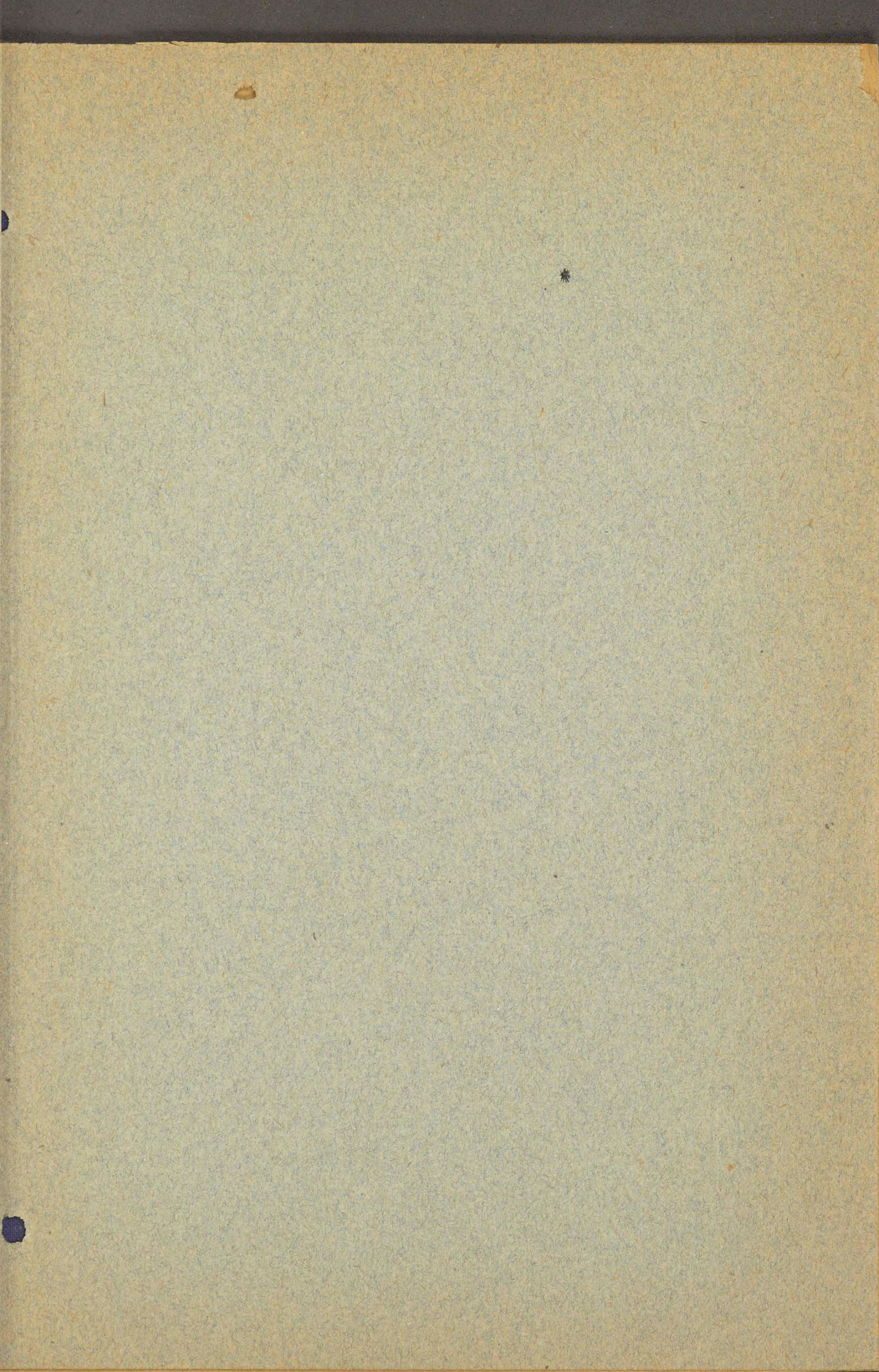
Three doubtful forms are also described.

1 $p \{4.20.\overline{24}.7\}$, probably correct symbols, but considered doubtful because the faces were too uneven to allow of satisfactory measurement.

2 $q \{2.16.\overline{18}.1\}$, a doubtful form too rounded for definite determination.

3 $t \{17.16.\overline{33}.1\}$, a doubtful form too rounded and uneven to allow of definite determination.

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